

First Record of the Gekkonid Genus *Cnemaspis* Strauch, 1887 from Gunung Mulu National Park, Northern Sarawak, East Malaysia may Represent an Undescribed Species

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Abstract We provide confirmed photographic evidence for the previously overlooked occurrence of the polyphyletic Asian gecko genus *Cnemaspis* from Gunung Mulu National Park, the world-renowned UNESCO natural heritage site in northern Sarawak, East Malaysia. This new record from Sarawak province represents a remarkable range extension for *Cnemaspis* cf. *kendallii* by 550 km to the northeast and denotes the most northern occurrence of the genus in Borneo. Our new finding makes it very likely that these gekkonid lizards also inhabit appropriate limestone karst habitats in adjacent Sabah, Brunei, and Kalimantan. Given the visible differences in the Mulu specimen compared to those from the remaining distribution range on Borneo and the Malaysian Peninsula together with the fact that numerous *Cnemaspis* species are restricted to small areas, it seems plausible that another undescribed, rather cryptic and possibly locally endemic Bornean species is involved. Lastly, the new record contributes to the importance of the Mulu National Park as a major conservation area in East Malaysia of international concerns.

Keywords Southeast Asia, Borneo, Gekkonidae, herpetofaunal diversity, new record

The polyphyletic gecko genus *Cnemaspis* comprises more than 105 species spread over three groups found in Africa (12 spp.) as well as South (> 50 spp.) and Southeast Asia (> 30 spp.). Southeast Asian members of the genus *Cnemaspis* are mainly nocturnal and distributed from Vietnam through the Malaysian Peninsula to the Greater Sunda Island of Borneo. In recent years, many new *Cnemaspis* species have been described from this vast tropical area (e.g., Das and Bauer, 1998). Currently, however, only four species of *Cnemaspis* are known from the Malaysian state of Sarawak, which forms the northwestern part of Borneo (Figure 1). These are *Cnemaspis kendallii*, *C. nigridia*, *C. dringi* as well as the recently

described *C. paripari* (Grismer and Chan, 2009). Another species, *C. affinis*, has been listed for Borneo but it seems to be restricted to the type locality, Pulau Penang (Pinang), off the west coast of the Malaysian Peninsula (Das and Bauer, 1998). Records from Sabah, the northern province of Borneo, and Brunei Darussalam as well as from Kalimantan, the Indonesian part of the island, are missing (Das and Bauer, 1998). Also from Kuala Lawas and Lambir Hills National Park north and south of the border of Brunei, respectively, the genus *Cnemaspis* has not been reported. Therefore, the northern-most confirmed record of this gecko genus on Borneo is *C. dringi* from the type locality Labang Camp (03°20' N, 113°29' E; Figure 1), Bintulu District, within the Fourth Division of Sarawak (Das and Bauer, 1998).

Gunung (= mountain) Mulu National Park with its world-renowned limestone cave systems was founded in 1974. The park is located in the northern part of Sarawak bordering the territory of Brunei Darussalam (Figure 1).

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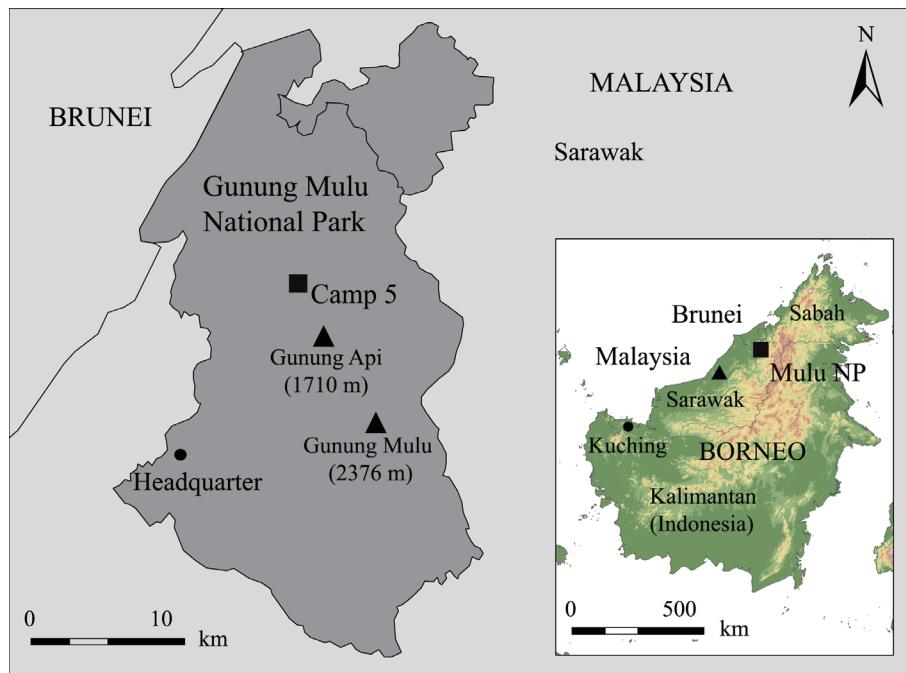


Figure 1 Map of Gunung Mulu National Park, northern Sarawak, Malaysia, showing the new record of *Cnemaspis* from camp 5. The so far northern-most confirmed record of this gecko genus on Borneo is *Cnemaspis dringi* from Labang Camp ($03^{\circ}20' N$, $113^{\circ}29' E$), Bintulu District, as indicated by the black triangle (\blacktriangle) on the inserted overview map of Borneo. The position of Mulu NP on the island is represented by the black square (\blacksquare). *Cnemaspis kendallii* is known only from the area around Kuching in the southwest of Sarawak.

It is famous for its rich bat fauna consisting of 28 species with a population of approximately three million wrinkle-lipped bats (*Chaerephon plicata*). Since 2000, it is an UNESCO natural world heritage site. The Mulu karst formations are characterized by a high percentage of endemic plant and (cave) animal species. About 3500 species of vascular plants, 300 bird species and more than 20 000 invertebrate species have been recorded from the park area which covers 53 000 hectares and 17 vegetation zones from sea level to the 2 377 m high summit of Gunung Mulu. The herpetofauna of the national park is also rich in species with more than 80 amphibian and 91 reptile species, respectively (Malkmus, 2002; Das *et al.*, 2008). Currently, 14 different gecko species are known from Mulu National Park, half of which belong to the diverse and wide-spread genus *Cyrtodactylus* but no *Cnemaspis* species has been recorded from this protected area (Das *et al.*, 2008).

In November 2013, Gunung Mulu National Park was visited for five days by the authors. In the evening of November 13, the surroundings of camp 5 near the 'pinnacles' limestone formation at the foot of Mount Api (1 710 m asl) approximately 12 km northeast of the park headquarters were explored. There, in the Melinau Gorge, the dense forest is directly flanked by steep limestone walls (Figure 2). These karst formations are inhabited by

the nocturnal *Cyrtodactylus consobrinus*. Next to these common geckos, another specimen was photographed that can undoubtedly be assigned to the genus *Cnemaspis* due to its broad, flattened head in combination with large, upwardly directed eyes, a dorsoventrally compressed body and long, widely splayed limbs with long, inflected digits, that are an adaptation for climbing on flat surfaces (Figure 3). Our observation represents the first record of this gecko genus for Gunung Mulu National Park (Das *et al.*, 2008). Though not in focus and only visible from the tail base upwards, the specimen is identifiable as a light night-time colour morph of *Cnemaspis kendallii* based on its general pattern. The limbs and the base of tail as well as the lateral body parts show a light brown to yellowish-olive ground colour. Dorsally, the specimen is crème-coloured and exhibits indistinct dark blotches, which are arranged in six regular pairs along the back. Also the neck shows some dark markings and the head is light grey with a distinct turquoise hue above the eyes.

Cnemaspis kendallii is wide-spread on the Malaysian Peninsula. Based on published records from Borneo, however, it has only been recorded from the area around Kuching at the most southwestern part of Sarawak (Das and Bauer, 1998). Therefore, the new record from Mulu National Park extends the known distribution range of this species on the island by about 550 km to the northeast.



Figure 2 View from camp 5 across the Melinau Gorge at the limestone karst formations around Mount Api in Gunung Mulu National Park, where a *Cnemaspis* specimen was encountered. Photo by André Koch.

For the entire genus *Cnemaspis*, the photographic record from camp 5 near Mt. Api still represents a remarkable range expansion by about 170 km.

Given the visible differences in the night-time colour pattern of the Mulu specimen (body and limbs stronger yellowish-olive coloured, dorsal rows of broader dark blotches transversely oriented, head grey with a turquoise hue above the eyes, see Figure 3) compared to specimens from Santubong National Park (Figure 4) near Kuching and the Malaysian Peninsula (body and limbs whitish-yellow to light brown, dorsal rows of dark vertebral and lateral spots longitudinally oriented, head same colour as body and limbs without turquoise hue) together with the fact that numerous *Cnemaspis* species are restricted to small distribution ranges (e.g., Grismer and Chan, 2009), it seems plausible that another undescribed, rather cryptic and possibly locally endemic Bornean species is involved. However, since the specimen disappeared after the first photographic flash, no further pictures could be taken and no other *C. cf. kendallii* individual was encountered during the short stay at camp 5. The remaining nocturnal herpetofauna consisted of *Hylarana glandulosa*, *Leptolalax dringi* and *Gonocephalus bornensis*. During the day, *Eutropis multifasciatus* and *Draco* sp. were seen. Voucher photographs for all specimens seen are deposited at the Section of Herpetology of the Zoological Research Museum Alexander Koenig (www.zfmk.de) in Bonn, Germany.

Compared to Sumatra and Java, the two other greater islands of the Sunda Shelf, Borneo is probably the best investigated in terms of its amphibian and reptile diversity. Nevertheless, the discovery of the genus *Cnemaspis* and a potentially undescribed species from Mulu National Park demonstrates the partly still

unexplored character of this diverse island herpetofauna. The new record from northeastern Sarawak province represents the most northern occurrence of the genus *Cnemaspis* on Borneo and makes it very likely that these lizards also inhabit appropriate limestone karst habitats in adjacent Sabah, Brunei, and Kalimantan. Especially the latter is rich in karst formations, which are a common geological feature along the east coast of Kalimantan. Therefore, further fieldwork is recommended and necessary to comprehensively cover and study the species-rich herpetofauna of Borneo which is still insufficiently known as demonstrated by frequent new species descriptions. Lastly, our new photographic record contributes to the importance of the Mulu National Park as a major biodiversity and conservation area of international concerns in East Malaysia.



Figure 3 First photographic record of *Cnemaspis* cf. *kendallii* from Gunung Mulu National Park. Though not in focus and visible only from the tail base upwards, the specimen is identifiable as a light night-time colour morph based on its general pattern. Photo by André Koch.



Figure 4 *Cnemaspis kendallii* from Santubong National Park near Kuching. Note the differences in colour pattern in this specimen of the light night-time morph. Photo by Lee Grismer.

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